



USING CUSTOMER SATISFACTION FOR MEASURING THE
EFFECTIVENESS OF INTEGRATED PRODUCT TEAMS

THESIS

Charles H. Embs
Captain, USAF

James N. Anderson
GS-13

AFIT/GCM/LAS/95S-1

DTIC QUALITY INSPECTED 5

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

DISTRIBUTION STATEMENT A

Approved for public release

AFIT/GCM/LAS/95S-1

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	



USING CUSTOMER SATISFACTION FOR MEASURING THE
EFFECTIVENESS OF INTEGRATED PRODUCT TEAMS

THESIS

Charles H. Embs
Captain, USAF

James N. Anderson
GS-13

AFIT/GCM/LAS/95S-1

Approved for public release; distribution unlimited

19951102 088

The views expressed in this thesis are those of the authors and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

AFIT/GCM/LAS/95S-1

USING CUSTOMER SATISFACTION FOR MEASURING THE
EFFECTIVENESS OF INTEGRATED PRODUCT TEAMS

THESIS

Presented to the Faculty of the School of
Logistics and Acquisition Management
of the Air Force Institute of Technology
Air University

in partial fulfillment of the Requirements for the
Degree of Master of Science in Contracting Management

Charles H. Embs, B.S.

James N. Anderson, B.S.

Captain, USAF

GS-13

September 1995

Approved for public release; distribution unlimited.

Acknowledgments

Chuck and Jim wish to thank all of those persons who assisted them in this research effort. Above all, we thank our advisor, Lt. Colonel Scott Graham, for his guidance, patience, and “hands-off” approach that made this task bearable. We would also like to thank Captain Ken Hamner for his assistance in helping us locate the data upon which this research effort was predicated. This research would not have been possible without the assistance of these two individuals.

Last, but certainly not least, we would both like to thank our spouses for their patience and understanding throughout this research effort. Their acceptance of the long hours at the computer, and the sometimes even longer hours of “brainstorming” at the local pub, was paramount to the success of this project.

Charles H. Embs
James N. Anderson

Table of Contents

	Page
Acknowledgments.....	ii
List of Tables.....	v
Abstract.....	vi
I. Introduction.....	1
Background.....	1
Statement of the Problem.....	3
Scope.....	5
Research Questions.....	6
II. Literature Review.....	7
Introduction.....	7
Why Measure Customer Satisfaction?.....	7
IPT Philosophy and ASC Organizations.....	12
Characteristics of Effective Teams.....	13
Group Interdependence.....	13
Outcome Interdependence.....	14
Criteria of Good Metrics.....	15
Meaningful to the Customer.....	16
Meeting Organizational Goals and Objectives.....	16
Simple, Understandable, Logical, and Repeatable.....	16
It Shows a Trend.....	17
It is Unambiguously Defined.....	17
Its Data is Economical to Collect.....	17
It is Timely.....	18
It Drives the Appropriate Action.....	18
Summary.....	18
III. Methodology.....	20
Overview.....	20
Customer and Criteria Identification.....	20
Data Collection Plan.....	21
Analysis Method.....	22

	Page
Research Questions.....	23
Research Question 1. Why measure customer satisfaction?.....	23
Research Question 2. What does an IPT in ASC consist of, and how do they operate?.....	23
Research Question 3. What are the key characteristics of effective teams?.....	23
Research Question 4. Who are the customers of ASC's IPTs?.....	24
Research Question 5. What characteristics of IPT performance do IPT customers perceive as most important?.....	26
B-1 Self-Assessment.....	26
B-2 Self-Assessment.....	27
F-15 Self-Assessment.....	27
F-16 Self-Assessment.....	29
F-22 Self-Assessment.....	30
C-17 Self-Assessment.....	31
Kenne Interviews.....	31
Research Question 6. Of those characteristics identified by the IPTs and their customers as most important, which are the most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs?.....	33
V. Summary, Conclusions, and Recommendations.....	37
Summary.....	37
Conclusions.....	38
Recommendations.....	41
Bibliography.....	43
Vitae.....	45

List of Tables

	Page
1. Primary Customers.....	24
2. B-1 Customer Satisfaction Data.....	26
3. F-15 Customer Satisfaction Data (External).....	28
4. F-15 Customer Satisfaction Data (Internal).....	29
5. F-16 Customer Satisfaction Data.....	30
6. F-22 Customer Satisfaction Data.....	30

Abstract

In attempting to develop a performance measurement system for assessing the effectiveness of Integrated Product Teams (IPTs), this research focused on the identification of those characteristics that were most important to the customers of IPTs. Customer satisfaction was selected as the focal point because it is the foundation of the Integrated Weapon System Management (IWSM) philosophy which fostered the IPT approach to conducting business. The customer satisfaction data was gathered from the Quality Air Force self-assessments conducted by the B-1, B-2, F-15, F-16, F-22, and C-17 System Program Offices, as well as interviews conducted by Brigadier General Kenne with several of the major customers of the Aeronautical Systems Center. The seven characteristics identified, through the analysis of the data gathered, provide the initial step in the development of a performance measurement system for assessing the effectiveness of IPTs.

USING CUSTOMER SATISFACTION FOR MEASURING THE EFFECTIVENESS OF INTEGRATED PRODUCT TEAMS

I. Introduction

Background

The merger of Air Force Systems Command (AFSC) and Air Force Logistics Command (AFLC) into the Air Force Materiel Command (AFMC) created a need to develop new ways of doing business. "As AFSC and AFLC integrated their activities, both commands learned that although they used the same words, they were not speaking the same language. For example, 'requirements' in AFSC meant the 'the user's needs' stated so that AFSC knew what they were expected to deliver to the customer. In AFLC, 'requirements' meant 'how many parts and supplies' were needed to sustain the user during peace and war" (AFMC, 1993: 9). Air Force leadership realized the need to implement a new management philosophy in order to meet the new challenges presented by the merger. The management philosophy developed was Integrated Weapon System Management (IWSM). "Integrated Weapon System Management is the AFMC management philosophy for acquiring, evolving, and sustaining our products. It empowers a single manager with authority over the widest range of decisions and resources to satisfy customer requirements throughout the life cycle of the product" (AFMC, 1993: 9). IWSM is centered around eight interacting elements. One of the

primary elements of IWSM, and certainly the most relevant to this research, is Integrated Product Development (IPD).

IPD “systematically employs a teaming of functional disciplines to integrate and concurrently apply all necessary processes to produce an effective and efficient product that satisfies customer’s needs” (AFMC, 1993: 275). In addition, IPD “requires a product focus and a complete understanding of the processes required to optimize the product. The products delivered will dictate the ultimate success of our efforts in the eyes of the customer” (AFMC, 1993: 276). In a White Paper, dated 21 April 1993, General Ronald W. Yates, AFMC Commander, wrote “The IPD philosophy and its basic tools will enable this command to realize the full benefit of Integrated Weapon System Management (IWSM)” (AFMC, 1993: 369).

The teaming concept emphasized in the IPD philosophy was implemented through the formation of Integrated Product Teams (IPTs). IPTs are “cross-functional teams that are formed for the specific purpose of delivering a product or managing a process for the customer. The team is not the end goal of IPD, but rather the means through which much of the work in an organization gets done” (AFMC, 1993: 288).

As commander of the Advanced Tactical Fighter System Program Office in 1990, Lieutenant General James A. Fain, acting under the direction of General Yates, became the pioneer for the implementation of IPTs as the primary working unit in a major weapon system acquisition in the Aeronautical Systems Center (ASC). In 1994, as Commander of ASC, Lieutenant General Fain directed that IPTs would be used for all procurement initiatives in ASC. This direction required all program offices to abandon the functional

organizational structure previously used and adopt an organizational structure that was more appropriately suited for IPT implementation. Each IPT consisted of a team leader, who was held responsible for the ultimate success or failure of the program, and a dedicated cadre of functional specialists whose role was to support the team leader in the manner required to accomplish the program objectives.

The foundation for all three tiers of the new management philosophy (IWSM, IPD, and IPT) is customer satisfaction. The IWSM concept emphasizes the need to empower a single manager with the authority to satisfy customer needs. The IPD concept focuses on the teaming of functional disciplines to produce an effective and efficient product that satisfies customer needs. And finally, the IPTs are the cross-functional teams with the specific purpose of delivering a quality product for the customer. Because of the enormous emphasis at all levels, customer satisfaction would appear to be the best foundation for the development of metrics for measuring IPT effectiveness.

Statement of the Problem

Since IPTs are a relatively new concept to the ASC environment, it is imperative that a set of performance measurements be established that will accurately indicate the quality of IPT performance. These performance measures, or metrics, must focus on those characteristics which are determined to be most critical to customer satisfaction. Equally important, the characteristics found to be most critical to customer satisfaction must be consistent with the criteria of good metrics as defined in the AFMC Metric Handbook.

A recent research effort (Casipit and Hodgkiss, 1994) studied the customer satisfaction programs of six quality award winning service organizations in the military and commercial sectors. ASC was one of the six organizations. The Casipit and Hodgkiss study centered around a series of questionnaires pertaining to developing, tracking, and using customer satisfaction inputs and outputs within each of the organizations. As an organization made up of a conglomeration of program offices, the responses provided by ASC were based on the input of those individual program offices rather than on a front office assessment of the appropriate responses. In light of that approach, and since IPTs are the primary working unit of the program offices, the responses provided by ASC can appropriately be extrapolated to the individual IPTs within each program office. The ASC responses that are driving this research are:

Question A3: Do you have corporate-wide buy-in for your customer satisfaction program?

ASC: Bottom line answer is no-- it is not corporate wide (Casipit and Hodgkiss, 1994: C-4).

Question B1: Did you develop your own customer satisfaction measure and methods to suit your organization's needs or did you essentially copy another organization's?

ASC: Some of both. Some of the SPO's and other 2 letter offices developed their own measures and methods to suit the needs of their specific customers and situation. Others simply copied generic measures and methods (surveys) from others (basically to be in compliance with ASC requirement that all organizations must measure customer satisfaction. Again, for ASC, the answer is "it depends" (Casipit and Hodgkiss, 1994: C-11).

Question B5: Do you determine the validity of these measures?

ASC: No, not really (Casipit and Hodgkiss, 1994: C-15).

Question C2: Do your customers help develop these measures? If so, how.

ASC: Yes in some cases and no in others. The B-2 CARD system and the LANTIRN SPO both developed their instruments (measures and methods) with the input from their customers. Other SPOs or offices developed measures without input from customers (Casipit and Hodgkiss, 1994: C-23).

A review of the ASC responses indicates that the development of customer satisfaction programs and measurement approaches within the individual program offices is currently at widely varying levels.

While AFMC organizations currently have standard metrics to identify, track, and report, in the areas of cost, schedule, and performance, at the program level, there are no metrics in place to measure the effectiveness of IPTs within the program office. The development and implementation of meaningful, customer-oriented metrics would allow management to identify the current level of IPT performance. For this to occur, the attributes necessary to achieve customer satisfaction, on the IPT level, must be identified, developed, and validated.

Scope

The purpose of this research is to facilitate the development of metrics for assessing the effectiveness of IPTs. Customer satisfaction is the key to the management philosophy implemented by IWSM and, as such, must be the central focus in the development of such metrics. This research will attempt to transform the needs of IPT customers into a consolidated group of important attributes necessary to determine the effectiveness of the IPT as a working unit. To accomplish this task, the following questions will guide this research.

Research Questions

1. Why measure customer satisfaction?
2. What does an IPT in ASC consist of, and how do they operate?
3. What are the key characteristics of effective teams?
4. Who are the customers of ASC's IPTs?
5. What characteristics of performance do IPTs and IPT customers perceive as most important?
6. Of those characteristics identified by the IPTs and their customers as most important, which are the most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs?

These characteristics will provide a foundation for the subsequent development of specific customer satisfaction metrics and will enable future researchers to more clearly focus their efforts on these areas.

The first three research questions will be addressed through a review of the current literature, in Chapter II, as it pertains to each individual subject. The final three research questions will be addressed through the analysis of information collected as part of the data collection process described in Chapter III.

II. Literature Review

Introduction

As noted in Chapter I, the IWSM philosophy has placed enormous emphasis on customer satisfaction as a quality measure. Customer satisfaction is today's biggest issue in the quality improvement movement and in business as a whole (Casipit and Hodgkiss, 1994: 2-2). This literature review will address the importance of measuring customer satisfaction and its effect on the business world as well as the Department of Defense.

Also, in order to measure customer satisfaction, a complete understanding of the subject to be measured (IPTs), as well as a complete understanding of the measuring instrument (metrics) is essential. This literature review describes the philosophy of IPTs and their role in ASC organizations. In turn, the need for effective team building and effective teams are explored in great detail in order to establish a foundation for the development of the most appropriate effectiveness metrics for IPTs. Finally, a summary of the literature review is presented.

Why Measure Customer Satisfaction?

Customer satisfaction is the cornerstone of the quality improvement movement. Armand Feigenbaum, a noted authority on the subject, defines quality as "the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product or service in use will *meet the expectations of the customer*" (Feigenbaum, 1983: 7). This definition raises several important implications:

1. Satisfaction, hence quality, depends upon evaluations made by persons external to the organization that produces the goods or services. It is not determined by some internal standard - unless that standard has been carefully established on the basis of accurate interpretations of customer information and feedback about their needs and expectations.
2. Customer satisfaction usually relates to long-term use of goods or results of a service, so its evaluation is based on comparison, over considerable time, with the customer's perception of competitive offerings.
3. Quality requires a composite of attributes to satisfy a range of expectations of numerous customers or potential customers. Quality often means different things to different people. (Dilworth, 1993: 463)

In a manufacturing/product environment, a person evaluates at least eight aspects of a product of service to see if it satisfies his or her needs. These aspects are:

1. Performance - such as color or clarity of a television.
2. Features - such as stereo sound or remote control.
3. Reliability - how often the product will need repair.
4. Serviceability - ease, expense, and time required to repair.
5. Durability - length of product life.
6. Conformance - how well the product meets the specifications set by the designers.
7. Aesthetic characteristics - how the item looks, smells, feels, etc.

8. Perceived quality - feeling of confidence based on company reputation or customers prior use of the product. (Garvin, 1987: 101)

Service quality, however, is not as easy to describe in quantifiable measures that can be used within a company to see if employees are working in a consistent and correct manner. Five major attributes found to be important in describing service quality are:

1. Reliability - the ability to perform the promised service dependably and accurately.
2. Responsiveness - the willingness to help customers and provide prompt service.
3. Tangibles - physical facilities, equipment, and the appearance of personnel.
4. Assurance - the knowledge and courtesy of employees and their ability to convey trust and confidence.
5. Empathy - the caring, individual attention provided to customers. (Zeithamal, Parasuraman, and Berry, 1990:26)

A service organization must identify specific attributes that are important and the degree to which they are important in satisfying its customers (Dilworth, 1993:465). For example, Metropolitan Life Insurance Company used surveys to determine customer expectations and their perceptions of the performance that was provided for the five major attributes of service quality listed above. By identifying what is important to its customer, the company can establish performance standards so its employees know what they are to do (Falzon, 1988: 55). "It may appear that quality is very expensive to achieve with so many attributes of the product to consider and all parts of a company involved in

trying to satisfy many customers. Quality does cost--but the failure to achieve quality may cost even more" (Dilworth, 1993:465).

Improving customer satisfaction is one of the most important challenges facing businesses in the 1990s (Barsky and Labaugh, 1992: 32). As Peterson and Wilson point out, it is the primary goal of any business. According to Peterson and Wilson:

For a business to be successful in the long run, it must satisfy customers, albeit at a profit. Indeed, it can be argued that satisfying customers is the primary *obligation* of a company. Hence, customer satisfaction is a defensible and appropriate company objective - the glue that holds various corporate functions together and directs corporate resource allocation. Conceptually, virtually all company activities, programs, and policies should be evaluated in terms of their contribution to satisfying customers. (Peterson and Wilson, 1992: 61)

The Department of Defense also emphasizes the fact that the customer defines quality and that the organization exists to satisfy the customer. According to the DOD TQM implementation guide:

The customer defines the purpose of the organization and every process within it. Success means striving to become the best supplier of your particular products and services in the minds of those customers. To achieve that success, your organization must align its overriding strategic vision with a vision of customer service and satisfaction. (DOD, 1990: 2-12)

With such evidence, it is obvious why organizations must explicitly and actively address customer satisfaction in the course of daily business.

The reasons for measuring customer satisfaction can be categorized along three lines: customer behavior, increased competition, and Governmental reform (Casipit and Hodgkiss, 1994: 2-3).

Customer behavior provides a strong impetus to measure customer satisfaction. Failure to ascertain the satisfaction level of your customers may result in the loss of their

business. Today's customer expect higher quality in products and services and have a much lower tolerance for poor service and goods.

Similarly, the increased level of competition that organizations are facing today, particularly from the international market place, makes it imperative that they be constantly in touch with the satisfaction level of their customers. Government organizations, such as aviation depots, are facing stiff competition with contractors and other government depots in the face of budget cutbacks (Federal Quality Institute, 1993: 2-1).

And finally, Governmental reform is mandating the measurement of customer satisfaction into the process. Executive Order 12862 - *Setting Customer Service Standards* was signed by President Clinton on 11 September 1993. The order requires Government agencies to have customer focus and reward performance and allocate resources based on customer satisfaction results (Clinton, 1993: 1737-1738). In addition, when Congress passed the Government Performance and Results Act of 1993, all Government agencies were required to increase the level of emphasis given to service quality and customer satisfaction. More specifically, the act requires that "effectiveness measures should be direct indicators of the final product or service as observed by the customer" (United States Senate, 1993: 15).

It should be evident from the preceding discussion that measuring customer satisfaction is done to improve processes, better satisfy the customer, and add value to the product or service (Casipit and Hodgkiss, 1994: 2-8).

IPT Philosophy and ASC Organizations

The United States Air Force defines Integrated Product Development (IPD) as: “A philosophy that systematically employs a teaming of functional disciplines to integrate and concurrently apply all necessary processes to produce an effective and efficient product that satisfies customer needs” (AFSC, 1991: 2-1). In the case of system program offices at ASC, this teaming approach is implemented through the use of IPTs to acquire all major weapon systems. The IPTs consist of a team leader, who is responsible for the ultimate success or failure of the program, and a dedicated cadre of functional specialists whose role is to support the team leader in the manner required to accomplish the program objectives.

ASC organizations operate on a project basis. Each new project requires the formation of a project group (IPT) consisting of a team leader and members from all appropriate functional areas. “The project manager creates a project group by negotiating with functional managers and then ‘borrowing’ the expertise and physical resources needed for the project” (Nicholas, 1990: 152). The project manager, or IPT team leader, integrates the support efforts of each team member to meet project goals. As projects are completed, all team members return to their functional areas for reassignment to new projects. This approach provides many benefits to the overall organization. Some of the specific benefits are:

1. Knowledge transfer. Workers share project experiences with colleagues in their fields of specialization which keeps them current in their profession.

2. Team formation. IPT membership can be tailored rather easily to accommodate unique projects or goals.
3. Schedules and resources. In a multiproject organization, schedules and resource requirements can be maintained and tracked for several projects at once. (Nicholas, 1990: 153)

Characteristics of Effective Teams

AFMC Pamphlet 800-60, Integrated Weapon Systems Management Guide, identifies team building as key to the success of any project. "You must establish a solid, dedicated, and knowledgeable team, consisting of key members from the acquisition program office and support program office" (AFMC, 1993: 21). Effective team building does not ensure success, but without it success cannot be attained. This concept is central to the thinking behind the IPT approach; a dedicated team of functional specialists, working in close coordination and under the direction of a single leader.

Different researchers have measured team effectiveness in a variety of ways. Two commonly found categories of team effectiveness are:

1. Group interdependence - how closely team members work together.
2. Outcome interdependence - commitment of team members to achievement of project goals and customer satisfaction.

Group Interdependence. Group interdependence is measured as the degree of task-driven interaction among group members (Guzzo and Shea, 1987: 138). Beyond actual physical time spent together, group interdependence encompasses:

1. Effective communication among members.
 2. Effective ways of resolving group process problems.
 3. Techniques for using conflict in a constructive way.
 4. Greater collaboration and creativity among team members.
 5. A more trusting, supportive atmosphere within the group.
 6. Clarification of the team's purpose and the role of each team member.
- (Nicholas, 1990: 205)

Outcome Interdependence. Successful projects are the result of teams which succeed in achieving what they set out to do. The prominent feature found in all successful teams is that they know what must be done and are committed to doing it. A study conducted by Peter Vaill identified three characteristics always present in the behavior and attitudes of members of high performing teams; time, feeling, and focus (Nicholas, 1990: 202-203). First, members devote extraordinary amounts of time to the task. Second, they have very strong feelings about the attainment of the goal. And third, they focus on key issues and have a clear list of priorities in mind. In addition, Vaill found that:

1. Commitment to the purpose of the system is never perfunctory and motivation is always high.
2. Teamwork is focused on the task. Members develop behaviors that enable them to what they must to accomplish the task.
3. Leadership is strong, clear, and never ambivalent.
4. The system is clearly bounded from other systems; members have a consciousness that they are "different".

In addition to accomplishment of the task, effective teams strive to maintain the integrity of the group; each aspect is dependent on the other. The failure of one team member to fully commit to the task may result in violations of aspects such as communication and trust, with a resulting failure to accomplish the primary task.

Criteria of Good Metrics

Why metrics? Bill Hewlett, a founder of Hewlett-Packard, used to say “‘You cannot manage what you cannot measure’, and his corollary was ‘What gets measured gets done’” (House and Price, 1991: 93). The challenge of any organization is to develop performance measures that will help the organization assess how well or how poorly they are doing. These measures must also motivate action to continually improve all business practices. Metrics are nothing more than meaningful measures. The AFMC Metrics Handbook defines metrics as “a measurement made over time, which communicates vital information about the quality of a process, activity, or resource” (AFMC, 1993: 3). The handbook identifies eight criteria of a good metric:

1. It is accepted as meaningful to the customer.
2. It tells how well organizational goals and objectives are being met through processes and tasks.
3. It is simple, understandable, logical, and repeatable.
4. It shows a trend.
5. It is unambiguously defined.
6. Its data is economical to collect.
7. It is timely.

BUT MOST IMPORTANTLY:

8. It drives the appropriate action.

Meaningful to the Customer. “Organizational literature usually has defined quality to mean meeting a preset standard or specification. TQM, however, defines quality as whatever the customer says is quality” (Kinlaw, 1992: 29). Kinlaw’s statement on quality certainly holds true for the development of good metrics. The customer is the ultimate user of the information and, therefore, the final judge as to its usefulness. Metrics which are designed to provide information which is of value only to the organization, and not the customer, are of no value to the quality improvement process.

Meeting Organizational Goals and Objectives. Metrics are not goals or objectives. Metrics measure various levels of goals and objectives, but they do not, in and of themselves, contribute to the actual achievement of the goals and objectives of the organization. Metrics do foster the achievement of goals and objectives through process improvement. Metrics must focus the attention of management on the areas which will result in the achievement of the goals and objectives of the organization (Hamner and La Fleur, 1993: 2-3).

Simple, Understandable, Logical, and Repeatable. “Measurement will only take root in our profession if it is relatively easy to do and provides valuable insights” (Fisk and Ford, 1993: 40). Metrics must be simple enough to be understood by everyone involved in the process, most importantly the customer. The logic inherent in the metric must be clear and well defined. In order to be repeatable, a metric must provide the same conclusion at a given point in the process regardless of the individual performing the

measurement (Hamner and La Fleur, 1993: 2-4). Repeatability is essential if the measurement is to be meaningful to the customer.

It Shows a Trend. One of the main purposes of a good metric is to facilitate continuous improvement. Accordingly, a good metric must reflect progress, or lack thereof, toward improved quality by indicating if quality is converging or diverging toward a goal (Juran, 1988: 77). Measurement over time is essential to determining the overall health of a process. The trends that can be detected via the measurement process are essential tools that allow management to concentrate their efforts on the areas which require their attention. A metric must provide management with a means of distinguishing the true problem areas.

It is Unambiguously Defined. It is imperative that a metric be unambiguously defined so that measurements at various points in time can be compared against the same baseline. A metric must define:

1. Who will take and record the measurement.
2. What exactly is to be measured.
3. When, or at what point in the process, the measurement is to be taken.

Any vagueness or complexity becomes a natural source of divisiveness.

(Juran, 1988: 76)

A metric which is defined so ambiguously that successive measurements cannot be used for comparison purposes is of no value to the quality improvement process.

Its Data is Economical to Collect. The metric must add value to the process. "The unit of measure should be established at that level of precision which enables us to

make valid decisions from the data. To go beyond that level of precision usually adds cost without adding value” (Juran, 1988: 78). If the effort and/or cost associated with collection of the data exceeds the benefit derived from the resulting process improvements, the metric is of no value to the quality improvement process.

It is Timely. Data must be collected and analyzed in a manner that allows management sufficient time to digest the data and influence the process. The more critical the process, the more essential it is that the data be timely. A metric must provide management with essential data in time to influence the process.

It Drives the Appropriate Action. Above all else, a metric must drive behavior that is attainable and results in continuous improvement to the process. A good metric focuses management’s attention on the true problem areas and results in positive actions which increase the organization’s chances of accomplishing its goals. Metrics which do not encompass both of these attributes, are counterproductive and of no value to the quality improvement process.

Summary

The initial research effort focused on the exploration of customer satisfaction, IPTs, team building, characteristics of effective teams, and criteria of good metrics. The philosophy of IPTs and its underlying focus, customer satisfaction, was defined within the IWSM philosophy. The research focus then shifted to the investigation of IPTs as the primary working unit of ASC. Since the objective of this research is to facilitate the development of metrics to measure the effectiveness of IPTs, a thorough analysis of

relevant team building, effective team characteristics, and relevant criteria for the development of metrics was accomplished. These efforts will provide a strong basis for identifying the attributes that are most critical to the success or failure of programs managed by IPTs and the subsequent development of performance measures for IPTs.

Chapter III will define the methodology that will be used to collect the data required for identification of the customer satisfaction attributes that are most critical to the success or failure of IPT programs.

III. Methodology

Overview

In order to identify those characteristics that are most critical to customer satisfaction, this research will: (1) identify the IPT customers and the criteria currently used by individual program offices to determine customer satisfaction levels; (2) gather data on the characteristics that are most important to the customers of IPTs; and (3) subject the data to analysis and use the results of that analysis to identify a manageable number of characteristics which are most appropriate for use in the development of a performance measurement system for measuring the effectiveness of IPTs.

In order to obtain an appropriate cross-section of organizations within ASC, this research will use the following SPOs as a representative sample: B-1, B-2, F-15, F-16, F-22, and C-17. These SPOs were identified by the ASC Quality Improvement Office (ASC/QI) as the leaders in the development of a system to appropriately determine the level of customer satisfaction that exists within each respective office.

Customer and Criteria Identification

In 1994, organizations within ASC were required to perform an internal Quality Air Force Self-Assessment. This assessment was intended to provide each organization an opportunity to examine the entire organization using the QAF criteria as a highly objective assessment tool.

In Section 7, Customer Focus and Satisfaction, each organization was required to identify its primary program customers. The actual breakdown of all customers for each

individual program will be discussed in Chapter IV. In addition, Section 7 discusses the systems/methods created by each SPO to monitor customer satisfaction levels. This information will provide a baseline of criteria currently used to determine customer satisfaction levels within ASC organizations. This information will also be addressed in Chapter IV.

Data Collection Plan

The second stage of the process will be to gather inputs from those customers identified in the unit self-assessments regarding the characteristics of IPT performance they (the customers) consider important. There are currently two sources of this data.

1. Quality Air Force Self-Assessment, Chapter 7 - Customer Focus and Satisfaction.

More specifically, Chapter 7 includes sections on customer expectations, customer relationship management, commitment to customers, customer satisfaction determination, customer satisfaction results, and customer satisfaction comparison.

2. Brigadier General Leslie Kenne's (ASC/CV) personal interviews with five major customers of ASC.

The customers are Air Mobility Command, Air Combat Command, Air Education and Training Command, Air Force Special Operations Command, and Headquarters Air Force Reserves. Brigadier General Kenne conducted these interviews in early 1995 by telephone. In some instances, Brigadier General Kenne interviewed more than one agency

within some of the commands. For example, AMC/LG and AMC/XP were both interviewed.

Analysis Method

The third stage of the process will be to analyze the customer inputs gathered from the self-assessments and the Kenne interviews in order to identify those characteristics most critical to customer satisfaction. By merging the inputs from both sources, a common ground between the existing criteria and the actual customer needs can be established. In turn, this commonality will isolate those characteristics that are identified as being most critical to customer satisfaction from the standpoint of both the IPTs and the customers. The characteristics which can be isolated will then be identified as the key characteristics against which metrics should be developed for the purpose of measuring the effectiveness of IPTs.

Chapter IV begins the actual synthesis of customer satisfaction data in ASC. It is focused on the identification of specific customers, retrieval of appropriate customer satisfaction data, and analysis of the data. The format of Chapter IV will involve answering the research guiding questions that were identified in Chapter I.

IV. Findings

Overview

As noted in Chapter 1, research questions 1, 2, and 3 were addressed in Chapter II, Literature Review. A brief synopsis of the findings for these three questions is provided in this chapter in order to maintain consistency of the research effort. Research questions 4, 5, and 6 will be addressed following the synopses of the previous three findings.

Research Questions

Research Question 1. Why measure customer satisfaction? Customer satisfaction is the cornerstone of the quality improvement movement. We must measure customer satisfaction in order to monitor our progress in improving the quality of our product or service. Ultimately, we measure customer satisfaction in order to improve processes, better satisfy the customer, and add value to the product or service.

Research Question 2. What does an IPT in ASC consist of, and how do they operate? An IPT in ASC consists of a team leader, who is responsible for the ultimate success or failure of the program, and a dedicated cadre of functional specialists whose role is to support the team leader in the manner required to accomplish the program objectives.

Research Question 3. What are the key characteristics of effective teams?
Two commonly found categories of team effectiveness are:

1. Group interdependence - how closely team members work together.

2. Outcome interdependence - commitment of team members to achievement of project goals and customer satisfaction.

Group interdependence is measured as the degree of task-driven interaction among group members. Beyond the physical time spent together, group interdependence is concentrated on how well team members work with one another. Outcome interdependence relates more to the dedication of the team members in achieving what they set out to do. In addition to accomplishment of the task, effective teams strive to maintain the integrity of the group. The failure of one team member to fully commit to the task may result in violations of aspects such as communication and trust, with a resulting failure to accomplish the primary task.

Research Question 4. Who are the customers of ASC's IPTs? In Section 7 of the QAF Self-Assessment, each organization was required to identify its primary program customers. Table 1 is a compilation of the responses.

TABLE 1
PRIMARY CUSTOMERS

Program	Customers
B-1	<ul style="list-style-type: none">• Air Combat Command• Air National Guard• Air Force Program Executive Office• Commander of ASC and OC-ALC• Other Product and Logistics Centers• Air Force Materiel Command• HQ USAF• Secretary of the Air Force for Acquisition• Office of the Secretary of Defense

TABLE 1 (CONTINUED)

B-2	<ul style="list-style-type: none"> • Air Combat Command • 509th Bomb Wing, Whiteman AFB, MO • Air Force Materiel Command • Air Force Program Executive Office • Secretary of the Air Force for Acquisition
F-15	<ul style="list-style-type: none"> • Air Combat Command • Air Force Materiel Command • Air Force Program Executive Office • Other SPOs • Air Logistics Centers • Test Organizations • Persons within the F-15 SPO
F-16	<ul style="list-style-type: none"> • Air Combat Command • Air National Guard • Air Force Reserves • Foreign Military Sales (FMS) Countries • European Participating Government (EPG) Countries • Air Force Materiel Command • Air Force Program Executive Office • Secretary of the Air Force for Acquisition • Air Logistics Centers • Product Centers • Congress
F-22	<ul style="list-style-type: none"> • Air Combat Command • Sacramento Air Logistics Center • San Antonio Air Logistics Center • Air Education and Training Command (AETC) • Air Force Program Executive Office • Secretary of the Air Force for Acquisition • Office of the Secretary of Defense (OSD) • Aeronautical Systems Center • Air Force Materiel Command • Defense Contractors • Congress
C-17	<ul style="list-style-type: none"> • Air Mobility Command • U.S. Army

Research Question 5. What characteristics of IPT performance do IPT customers perceive as most important? The first part of this section will address the customer satisfaction information found in the self-assessments of each SPO. In addition, this discussion will include a breakdown of the actual tools (surveys) used by each SPO to gather customer satisfaction data.

The second part of the section will address the customer satisfaction information found in the interviews conducted by Brigadier General Kenne. Specifically, the areas that ASC customers have identified as deficient will be explored.

B-1 Self-Assessment. The primary tool used by the B-1 SPO to measure customer satisfaction is the Customer Satisfaction Assessment Survey. The survey is used to collect data relating to four areas: (1) program execution, (2) financial management, (3) product acceptability, and (4) working relationships. The feedback received from the surveys is used to focus SPO management attention in areas where improvements need to be made. Table 2 depicts the actual aspects of customer satisfaction focus on the B-1 Customer Satisfaction Assessment.

TABLE 2

B-1 CUSTOMER SATISFACTION DATA

How is the SPO Doing?	How is the Overall Program?
<ul style="list-style-type: none"> • Overall SPO Performance • Meeting Management Commitments • Communications • Responsiveness • "Quality" of People Working Program • "Quantity" of People Working Program • Keeping YOU Involved 	<ul style="list-style-type: none"> • Overall Contractor Performance • Technical Performance • Schedule Performance • Cost Performance • Overall Product Quality • Meeting Commitments Other Than Product Delivery • Communication

In addition to the areas listed in Table 2, there is a space provided to note any written comments or suggestions for improving customer satisfaction.

B-2 Self-Assessment. The B-2 SPO does not have a customer satisfaction instrument, such as a survey, that is given to its customers on a periodic basis. However, the B-2 SPO has developed a Capability Assessment Reference Document (CARD) database that enables the SPO to better understand and work the resolution of problems that limit ACC's required B-2 capabilities. The CARD process focuses on individual weapon system requirements that the user expects the SPO/contractor team to meet. From this database, the B-2 SPO focuses its customer satisfaction efforts in four main areas: (1) closure, or removal, of high priority items from the CARD, (2) consistent and timely responses to customer inquiries, (3) the taking of immediate action on crisis or safety-of-flight problems, and (4) the elimination or mitigation of impacts to the production line.

F-15 Self-Assessment. The F-15 SPO uses several methods to determine customer satisfaction. Methods are separated according to customer type (external and internal customers focus) and quantitative/qualitative nature. Methods for determining external customer satisfaction include: (1) Customer Satisfaction Assessments, (2) Customer Site Visits, (3) Quantitative Metrics, and (4) Management Reviews. Table 3 lists the specific areas contained within each of the external customer satisfaction methods.

In addition to the areas listed in Table 3, there is a space provided to note any written comments or suggestions for improving customer satisfaction.

Methods for determining internal customer satisfaction include: (1) ASC Cultural Survey, (2) Continuous Improvement Team (CIT) survey, and (3) IWSM survey. Table 4 lists the specific areas contained within each of the external customer satisfaction methods.

In addition to the areas listed in Table 4, there is a space provided to note any written comments or suggestions for improving customer satisfaction.

TABLE 3
F-15 CUSTOMER SATISFACTION DATA (EXTERNAL)

Method	Specific Area Addressed
Customer Satisfaction Assessment	<ul style="list-style-type: none"> • Depot maintenance • User involvement • Supply support • Aircraft support • Assessment of the Program Office • Determination of Program cost • System management and technical support
Customer Site Visits	<ul style="list-style-type: none"> • Interface for specific products and services
Management Reviews	<ul style="list-style-type: none"> • Specific cost, schedule, and performance data for individual programs
Quantitative Metrics	<ul style="list-style-type: none"> • Focus on effective management of systems

TABLE 4

F-15 CUSTOMER SATISFACTION DATA (INTERNAL)

Method	Specific Area Addressed
ASC Cultural Survey	<ul style="list-style-type: none"> • Examines senior and mid-level leadership performance in human resource management • Support to individuals within the organization • Implementation of QAF improvements
CIT Survey	<ul style="list-style-type: none"> • Processes • Facilities • Management • Communication
IWSM Survey	<ul style="list-style-type: none"> • TQM implementation • Communication • Empowerment • Management • Customer feedback • Quality teams

F-16 Self-Assessment. The F-16 SPO, much like the B-1 SPO, uses a Customer Satisfaction Assessment Survey as a means to determine customer satisfaction. The survey focuses on the collection of data relating to five areas: (1) program execution, (2) financial management, (3) product acceptability, (4) working relationships, and (5) other topics. The specific areas of interest within each of these areas are depicted in Table 5.

In addition to the areas listed in Table 5, there is a space provided to note any written comments or suggestions for improving customer satisfaction.

TABLE 5
F-16 CUSTOMER SATISFACTION DATA

Program Execution	<ul style="list-style-type: none"> • Provides you with viable alternatives • Involves you in technical decisions • Involves you is scheduling decisions • Meets its scheduling commitments • Involves you in structuring the program baseline • R&PC provides you with an opportunity to identify new requirement and air frame mission deficiencies
Program Financial Management	<ul style="list-style-type: none"> • Involves you in program financial exercises • Supports your budget exercises • Provides you visibility into funding status and needs • Manages program funds
Product Acceptability	<ul style="list-style-type: none"> • Performance • Hardware quality • Software quality • Supportability • User friendliness • Affordability
Working Relationships	<ul style="list-style-type: none"> • Fosters a team approach • Responds to your communications • Provides you with information • Emits a single face to the user philosophy
Other Topics	<ul style="list-style-type: none"> • Did you receive the product/service you asked for? • Did you receive it on time? • What is your #1 concern with us?

F-22 Self-Assessment. The F-22 SPO sends quarterly surveys to its primary customers. The purpose of the survey is to document the customer's satisfaction with F-22 products and working relationships. The survey is divided into three sections. The first section asks two primary questions that the SPO would like answered: (1) How satisfied are you with F-22 products? (2) How well is the Program Office working with you? The second section is an optional section for the customer to provide comments on specific areas of the program. These areas are listed in Table 6.

TABLE 6

F-22 CUSTOMER SATISFACTION DATA

F-22 Program Assessment Indicators - Comments/Concerns
<ul style="list-style-type: none"> • Performance Characteristics • Test and Evaluation • Logistics Requirements and Sustainment Objectives • Cost • Funding • Schedule • Contracts • Production • Management Structure • Reports/Briefings

The third section of the survey lists the SPO's top five program priorities and asks the customer to provide its top program priorities.

C-17 Self-Assessment. The C-17 SPO does not rely on comment cards or questionnaires to determine customer satisfaction. It is their belief that they have failed when the customer finds that it needs to formally write regarding lack of attention to the issues. Rather, they rely on daily face-to-face interchanges at all levels of the program office to search out better ways of understanding and meeting the needs of the customer. The key to this interaction is the complete exchange of information to ensure that the issues and needs of the customer are fully understood. The C-17 SPO defines customer satisfaction as meeting product and delivery requirements.

Kenne Interviews. Brigadier General Kenne's interviews with the Air Mobility Command, Air Combat Command, Air Education and Training Command, Air Force Special Operations Command, and Headquarters Air Force Reserves revealed three

areas as being of particular importance. Those three areas are: (1) communications, (2) responsiveness, and (3) strategic planning. The customer concerns in the area of communications centered on earlier user involvement, more information on tradeoff possibilities, and more effective feedback on contractual and financial matters. In regard to responsiveness, the customers emphasized the need for better support in the case of short-turnaround requirements and “what-if” exercises. Finally, the customer concerns in the area of strategic planning revolved around more effective up-front planning regarding the feasibility of a solution, more aggressive and effective risk management, and a more proactive approach in anticipating issues before they become problems.

In addition, Brigadier General Kenne also had the MAJCOMs prioritize the more traditional indicators of cost, schedule, and performance. Interestingly, in a time of severe budget constraints, performance is still the number one priority of the MAJCOMs, with cost and schedule rated relatively the same, but below performance.

The MAJCOMs were also asked to identify any other items they considered to be better indicators than cost, schedule, and performance. The three additional indicators identified were: (1) life cycle cost reduction, (2) degree of commonality, and (3) mobility footprint. These three indicators represent a very logistics-oriented and “big picture” approach to the acquisition of future weapon systems. While life cycle cost reduction is always a consideration in the acquisition of a new weapon system, the MAJCOMs indicated a strong desire to place greater emphasis, up front, on this issue. Degree of commonality refers to the use of common parts/systems between major weapon systems. Concentrated efforts to develop systems that could be used interchangeably might cost

more on the front side, but will decrease the overall life cycle costs and shorten logistical support lines required to maintain the particular weapon systems. And finally, mobility footprint refers to the time and support needed to get a weapon system to a fully deployable stage; it focuses on the all aspects of logistical support.

Research Question 6. Of those characteristics identified by the IPTs and their customers as most important, which are the most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs? As discussed in Chapter III, our approach to analyzing the data gathered from the self-assessments and the Kenne interviews will entail a merging, or comparison, of the inputs from both sources. By merging the inputs from both sources, a common ground between the existing criteria and the actual customer needs can be established. In turn, this commonality will isolate those characteristics that are identified as being most critical to customer satisfaction from the standpoint of both the IPTs and their customers. The characteristics which can be isolated will then be identified as the key characteristics against which metrics should be developed for the purpose of measuring the effectiveness of IPTs.

A comparison of the data gathered from the two sources reveals some interesting points: (1) the traditional indicators of cost, schedule, and performance are still of considerable importance to the customers; (2) there are other indicators, such as communication and responsiveness, that are common throughout the self-assessments and the Kenne interviews; (3) there is a movement toward logistics-oriented indicators in both the F-15 and F-22 self-assessments, as well as the Kenne interviews; and (4) there appears

to be a desire for more emphasis on strategic planning on the part of the customers (Kenne interviews) that does not seem to be reflected in the SPO self-assessments.

The emphasis on cost, schedule, and performance is evident throughout the self-assessments and the Kenne interviews. There are currently program office metrics in place based on these traditional indicators, and any attempt to develop metrics for the purpose of measuring IPT effectiveness cannot discard cost, schedule, and performance as relevant bases for a performance measurement system. There are, however, other indicators which are more relevant to the team approach fostered by the IWSM philosophy. Two of these which show up often in the data gathered are communication and responsiveness. These two indicators are very consistent with the tenets of IWSM and the concepts upon which the IPT approach is founded. The IPT approach is founded on communication between the parties and responsiveness of the IPTs to the concerns and needs of the customer.

“It is important to get customer involvement as early as possible. Customers may have input or issues that will impact the way the single manager will conduct business. They are as much a part of the overall team as program office personnel, and their early participation is essential.” (AFMC, 1993: 22)

“A single manager is empowered with the maximum authority over the widest range of program decisions and resources to satisfy customer’s requirements. This gives the user a single individual to address any issues that need to be worked to ensure our war fighters are supported.” (AFMC, 1993: 12)

Continuing to explore communication and responsiveness, only one organization appears to dedicate considerable effort to determining the satisfaction of IPT members as internal customers. The F-15 SPO has employed a lengthy, computer-based survey that is used to determine/solicit the views and feelings that exist in the SPO environment. Although many of the organizations, including the F-15, use the ASC Cultural Survey to

evaluate the working climate of the whole organization, an additional measurement system that solicits the individual thoughts of IPT members may provide valuable information that will enhance a SPO's ability to effectively build solid teams (IPTs) in the future. "One of the most critical areas of a program's development and execution is forming a solid, cohesive team early in the integration process" (AFMC, 1993: 29).

The movement toward logistics-oriented indicators that is evident in the F-15 and F-22 self-assessments, as well as the Kenne interviews, appears to represent a realization on the part of the IPTs and their customers of the cost impact associated with the logistics support of a system. Under the IWSM philosophy, the single manager is the single individual who ties together two formerly separate functions: systems acquisition and sustainment.

"The single manager, because of the nature of the life cycle responsibilities that are inherent in the IWSM concept, will be key to establishing the **partnership** between acquisition and sustainment." (AFMC, 1993: 14)

Given the budget constraints that currently exist and the significant portion of the cost of a weapon system that can be attributed to logistics support, the movement toward logistics-oriented indicators may be one that will continue, and probably expand, in the future.

The desire of the customers to increase the emphasis on strategic planning is not surprising given the strategic planning movement currently underway within the Federal Government. The Government Performance and Results Act mandates the use of a strategic planning approach within all Federal organizations. The strategic plans will cover a minimum of five years and be updated at least every three years. Each

organization's mission is the cornerstone of its strategic plan. "Once its general goals and objectives are developed, it is necessary to set specific, objective, measurable goals" (United States Senate, 1993: 15). These goals must be tied to the organizations day-to-day activities and must drive its performance. With the emergence of such guidance, and the benefits to be realized through such an approach, strategic planning will become of even greater importance to the customers of IPTs.

Based on the above discussion, seven characteristics were identified as being the most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs. Those seven characteristics must be the foundation for any IPT performance measurement system. The seven characteristics, and the rationale for their selection, are discussed in detail in Chapter V.

V. Summary, Conclusions, and Recommendations

Summary

Chapter I of this research effort introduced the problems encountered by the Air Force in merging AFSC and AFLC. These problems drove a new management philosophy known as Integrated Weapon System Management (IWSM). IWSM “empowered a single manager with authority over the widest range of decisions and resources to satisfy customer requirements throughout the life cycle of the product”. Out of the IWSM philosophy, came the concept of Integrated Product Teams (IPTs). IPTs are “cross-functional teams that are formed for the specific purpose of delivering a product or managing a process for the customer”. Based on the direction of General Fain, IPTs became the primary working unit within ASC. The switch to an IPT approach within ASC made it imperative that a performance measurement system be established in order to accurately assess the quality of IPT performance. There is currently no such measurement system within ASC.

The focus of this research is on the identification of characteristics which can provide the foundation for the establishment of a performance measurement system that can accurately assess the effectiveness of IPTs. Since customer satisfaction is the key to the management philosophy implemented by IWSM, it must also be the central focus in the development of the performance measurement system. Data regarding those characteristics considered most important to the IPTs and their customers was gathered primarily from two sources: (1) Chapter 7 of the Quality Air Force Self-Assessments for

the B-1, B-2, F-15, F-16, F-22, and C-17 SPOs and (2) personal interviews conducted by Brigadier General Kenne with five major customers of ASC. The data gathered was then subjected to an analysis to determine those characteristics most appropriate as a foundation for the development of a performance measurement for assessing the effectiveness of IPTs. By merging the inputs from both data sources, a common ground between the existing criteria and the actual customer needs was established. In turn, this commonality enabled the researchers to isolate those characteristics that are identified as being most critical to customer satisfaction from the standpoint of both the IPTs and the customers. The seven characteristics which were isolated in this manner were then identified as the key characteristics against which metrics should be developed for the purpose of measuring the effectiveness of IPTs.

Conclusions

The seven characteristics identified as being the most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs were: (1) cost, (2) schedule, (3) performance, (4) communication, (5) responsiveness, (6) logistics support, and (7) strategic planning. These characteristics have been identified through the analysis of data gathered from the six SPO self-assessments and interviews conducted by Brigadier General Kenne with five major customers of ASC. The characteristics identified were chosen primarily because: (1) they appeared consistently in both the SPO self-assessments and the Kenne interviews and (2) they were consistent with both the IWSM philosophy and current trends in Federal Government and Air Force policy. The ultimate selection of

the seven characteristics certainly required some degree of subjectivity on the part of the researchers. However, the patterns prevalent in the data showed clear trends as to the preferences of the customers of ASC. Each of the seven characteristics will be discussed in greater detail in the following paragraphs.

As discussed in Chapter IV, the emphasis on **cost, schedule, and performance** was evident throughout both the SPO self-assessments and the Kenne interviews. These three characteristics were found in all six of the SPO self-assessments, as well as being a key topic of discussion in the Kenne interviews. While the initial intent of the researchers was to evolve away from the more traditional characteristics such as cost, schedule, and performance, the strong presence of these characteristics in the data gathered made it imperative that they be included in the relevant database as a potential foundation for the development of IPT metrics. Currently, there are program office metrics in place based on these traditional indicators, however the current metrics must be revised to be more compatible with the IPT philosophy.

Communication and responsiveness were two other characteristics that showed up consistently in the data gathered. These characteristics were found in the B-1, B-2, F-15, and C-17 self-assessments, as well as the Kenne interviews. The consistent presence of these two characteristics in the data, as well as the relationship of the characteristics to the overall intent of the IWSM approach, made it imperative that both communication and responsiveness be included in the relevant database as a potential foundation for the development of IPT metrics. The IWSM approach is founded on communication between the parties and responsiveness of the IPTs to the concerns and needs of the customer. The

development of a performance measurement system for IPTs without including these two characteristics would be inconsistent with the elements of IWSM and counterproductive to continuous improvement efforts.

It was also evident from the data gathered that **logistics support** was a characteristic that was of considerable concern to the customers of ASC. This characteristic was found in the F-15 and F-22 self-assessments, as well as the Kenne interviews. Again, this characteristic is consistent with the overall IWSM philosophy and the goal of that philosophy to present a single manager who is responsible for both systems acquisition and sustainment. This relationship to the IWSM philosophy, and the significant presence of the characteristic in the data, made it imperative that logistics support be included in the relevant database.

The final characteristic identified as being most appropriate as a foundation for the development of metrics for measuring the effectiveness of IPTs was **strategic planning**. The only presence of this characteristic in the data gathered was in the Kenne interviews. However, the strong presence there and the significant emphasis being placed on strategic planning within the Federal Government made it imperative that this characteristic be included in the relevant database. As discussed in Chapter IV, the Government Performance and Results Act mandates the use of a strategic planning approach within all Federal organizations. Such a mandate ensures that strategic planning will become an even greater concern to the customers of IPTs and should be of considerable importance in the development of any performance measurement system for IPTs.

The identification of these characteristics is only the first step in the overall process of developing an IPT performance measurement system. The characteristics represent an important initial building block in the development of metrics to measure IPT effectiveness. The potential for further research into the characteristics identified and how they can be evolved into specific metrics for measuring IPT effectiveness is certainly present.

The identification of these characteristics will enable future researchers to focus their efforts on developing metrics for assessing IPT performance, rather than attempting to isolate those characteristics against which the metrics should be developed. Such focus should expedite the development of an effective IPT performance measurement system.

Recommendations

As discussed above, there is considerable potential for further research into the characteristics identified by this research and how they can be evolved into specific metrics for measuring IPT effectiveness. In order to proceed beyond this initial step and develop actual metrics for assessing IPT performance, future researchers must focus their attention on the characteristics identified herein and the criteria for effective metrics which have previously been explored in Chapter II. Additional research must be conducted within the IPT environment to ensure that the metrics developed are meaningful, repeatable, timely and, most importantly, capable of driving the appropriate action. The seven areas identified in this research must be broken down even further to discover the actual relationships that occur between the IPTs and their customers. For example,

communication is a very broad subject. When a customer wishes to improve communication he/she is probably not in need of a more sophisticated telephone. What type of communication needs improvement? Does the customer desire more input into decision-making? Does he/she just want to know the contractor's schedule status?

Breaking communication down into categories such as (1) information (providing daily, monthly, etc., reports), (2) decision-making (requests for guidance/advice), and (3) approvals (coordinating mandatory actions with the appropriate approving authority) would be the next logical step into developing effectiveness measures for IPTs.

Regardless of what the actual subcategories of communication are, future research in this area will dictate the need to work very closely with functioning IPTs. Future researchers will almost need to become members of an IPT to understand the day-to-day interfaces that occur between IPTs and their customers. By being so closely related to a team, the future researcher can then discriminate, through experience, between critical customer interactions and daily administrative actions.

Bibliography

- Air Force Material Command (AFMC). Integrated Weapon System Management Guide. AFMCP 800-60. Wright-Patterson AFB OH, 31 March 1993.
- Air Force Systems Command (AFSC). The Metrics Handbook. Andrews AFB, Washington DC: HQ AFSC, August 1991.
- Aldenderfer, Mark S. and Roger K. Blashfield. Cluster Analysis. Newbury Park: Sage Publications, Inc., 1984.
- Barsky, Jonathan D. and Richard Labaugh. "A Strategy for Customer Satisfaction," The Cornell H.R.A. Quarterly: 32-39 (October 1992).
- Clinton, William J. "Executive Order 12862-Setting Customer Service Standards," Weekly Compilation of Presidential Documents, 29: 1737-1738 (September 13, 1993).
- Cooper, Donald R. and C. William Emory. Business Research Methods. Chicago: Richard D. Irwin, Inc., 1995.
- Department of Defense. Total Quality Management Guide: A 2 Volume Guide for Defense Organizations. (Final Draft) Vol 2. Washington: GPO, 1990.
- Dilworth, James B. Production and Operations Management. New York: McGraw-Hill, Inc., 1993.
- Falzon, John J. "Measuring the Quality of Services," Total Quality Performance: 54-58 (1988).
- Federal Quality Institute. Quality Improvement Prototype Award, 1993: Cherry Point Naval Aviation Depot. Washington: GPO, 1993.
- Feigenbaum, Armand V. Total Quality Control (Third Edition). New York: McGraw-Hill, 1983.
- Fisk, Catherine and Donald J. Ford. "Benchmarking HRD," Training & Development, 47: 36-41 (June 1993).
- Garvin, David A. "Competing on the Eight Dimensions of Quality," Harvard Business Review: 101-109 (November-December 1987).
- Guzzo, Richard A. and Gregory P. Shea. "Group Effectiveness: What Really Matters?," Sloan Management Review: 138 (Spring 1987).

- Hamner, Captain Kenneth. Project Officer, Quality Improvement Office, Aeronautical Systems Center, Wright-Patterson AFB OH. Personal correspondence. 23 February 1995.
- Hamner, Captain Kenneth L. and Captain Charles A. La Fleur. An Exploratory Survey of Methods Used to Develop Measures of Performance. MS Thesis (AFIT/GSM/LAS/93S-6). School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1993. AD-A273945.
- House, Charles H. and Raymond L. Price. "The Return Map: Tracking Product Teams," Harvard Business Review, 60: 92-100 (January 1991).
- Howe, Roger J. "Building Teams For Increased Productivity," Personnel Journal: 16-22 (January 1977).
- Juran, J.M. Juran on Planning for Quality. New York: The Free Press, 1988.
- Khuri, Captain F. Paul and Captain Howard M. Plevyak, Jr. An Investigation of Integrated Product Development Implement Issues: A Case Study of Bosma Machine and Tool Corp. MS Thesis (AFIT/GSM/LAS/93S-11). School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1993. AD-A273917.
- Kinlaw, Dennis C. Continuous Improvement and Measurement for Total Quality: A Team-Based Approach. San Diego: Pfeiffer and Co., 1992.
- Nicholas, John M. Managing Business and Engineering Projects. New Jersey: Prentice-Hall, Inc., 1990.
- Peterson, Robert A. and William R. Wilson. "Measuring Customer Satisfaction: Fact and Artifact," Journal of the Academy of Marketing Science, 20: 61-71 (Winter 1992).
- United States Senate. Government Performance and Results Act of 1993: Report of the Committee on Governmental Affairs. Report Series S-20, 103rd Congress, 1st Session. Washington: GPO, 1993.
- Zeithamal, Valerie A., A. Parasuraman, and Leonard L. Berry. Delivering Service Quality: Balancing Customer Perceptions and Expectations. New York: Free Press, 1990.

Vita

Mr. James N. Anderson earned a Bachelor of Science Degree in Business Administration from Wright State University in 1972. After graduation, he was employed by Wright-Patterson AFB as a contract negotiator. He has served as a contracting officer on such major programs as the A-10, KC-10, B-2, and F-16. In May 1994, he was selected to be a candidate for the degree of Master of Science in Contracting Management from the Air Force Institute of Technology.

Permanent Address:

1450 Meadowlands Dr.
Fairborn, Ohio 45324

Vita

Captain Charles H. Embs earned a Bachelor of Science degree in Economics from the United States Air Force Academy in 1991. After graduation, he was assigned to Grissom AFB, IN as a contracts management officer. In 1993, he was assigned to Wright-Patterson AFB as a contract negotiator in the F-16 System Program Office. In May 1994, he was selected to be a candidate for the degree of Master of Science in Contracting Management from the Air Force Institute of Technology.

Permanent Address:

308 Mosby Lane
Wright-Patterson AFB, OH 45433

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE

September 1995

3. REPORT TYPE AND DATES COVERED

Master's Thesis

4. TITLE AND SUBTITLE

USING CUSTOMER SATISFACTION FOR MEASURING
THE EFFECTIVENESS OF INTEGRATED PRODUCT TEAMS

5. FUNDING NUMBERS

6. AUTHOR(S)

James N. Anderson, GS-13
Charles H. Embs, Captain, USAF

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Air Force Institute of Technology,
WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION
REPORT NUMBER

AFIT/GCM/LAS/95S-1

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING
AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

In attempting to develop a performance measurement system for assessing the effectiveness of Integrated Product Teams (IPTs), this research focused on the identification of those characteristics that were most important to the customers of IPTs. Customer satisfaction was selected as the focal point because it is the foundation of the Integrated Weapon System Management (IWSM) philosophy which fostered the IPT approach to conducting business. The customer satisfaction data was gathered from the Quality Air Force self-assessments conducted by the B-1, B-2, F-15, F-16, F-22, and C-17 System Program Offices, as well as interviews conducted by Brigadier General Kenne with several of the major customers of the Aeronautical Systems Center. The seven characteristics identified, through the analysis of the data gathered, provide the initial step in the development of a performance measurement system for assessing the effectiveness of IPTs.

14. SUBJECT TERMS

Customer Satisfaction, Metric, Integrated Weapon Systems Management,
Integrated Product Teams, Quality Improvement

15. NUMBER OF PAGES

55

16. PRICE CODE

17. SECURITY CLASSIFICATION
OF REPORT

Unclassified

18. SECURITY CLASSIFICATION
OF THIS PAGE

Unclassified

19. SECURITY CLASSIFICATION
OF ABSTRACT

Unclassified

20. LIMITATION OF ABSTRACT

UL